

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/715,255 Confirmation No. : 4980  
Applicant : Tsz Simon Cheng  
Filed : November 17, 2003  
TC/A.U. : 3625  
Examiner : Zurita, James H.  
Docket No. : BOC9-2003-0015 (385)

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**DECLARATION UNDER 37 C.F.R. § 1.131**

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Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Ying Huang, a citizen of the United States, residing in Westchester, New York, hereby declare and state as follows:

1. I was employed by International Business Machines Corporation (IBM) of Armonk, New York at the time the above-identified application was conceived. I make this declaration in support of the above-identified application.

2. IBM has invested substantial time and effort into the research, development, and marketing of their products, and in an effort to protect its rights in all new inventions, IBM requests that all employees prepare and submit confidential Invention Disclosure Forms upon conception by the inventor(s).

3. As a named co-inventor for this invention, I and my co-inventors prepared and submitted the attached Invention Disclosure No. BOC8-2002-0086 (hereinafter "Invention Disclosure") pursuant to IBM guidelines.

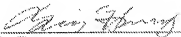
4. The Invention Disclosure was originally submitted for consideration to an IBM Attorney/Patent Professional for preparation of a patent application on July 12, 2002, and was insubstantially modified on August 2, 2002. The content of the Invention Disclosure has not been subsequently modified. The Invention Disclosure represents a fully conceived and workable invention as written. I reviewed the claims of the above-mentioned patent application prior to submission of the application to assure the claimed invention was fully supported by the

Invention Disclosure in light of the Invention Disclosure and art known at the time of the disclosure.

5. I diligently worked with outside counsel to prepare and file the above-mentioned patent application.

6. I make this Declaration to establish that my co-inventors and I conceived of the present invention at least as early as July 12, 2002, and exercised due diligence from that date to the date of filing for the above-identified patent application.

7. I further declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code, and that such willful, false statements may jeopardize the validity of the above-identified patent application or any patent issuing thereon.

  
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Ying Huang

Date: June 18, 2009

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Amaresh Rajasekharan, a citizen of India, residing in Cortlandt Manor, New York, hereby declare and state as follows:

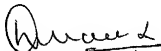
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Amaresh Rajasekharan

Date: 06/22/2009

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Tsz Simon Cheng, a citizen of the United States, residing in Grand Prairie, Texas, hereby declare and state as follows:


1. I was employed by International Business Machines Corporation (IBM) of Armonk, New York at the time the above-identified application was conceived. I make this declaration in support of the above-identified application.
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\_\_\_\_\_  
Tsz Simon Cheng

Date: 5/8/2009

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Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Frederick Wu, a citizen of the United States, residing in Cos Cob, Connecticut, hereby declare and state as follows:

1. I was employed by International Business Machines Corporation (IBM) of Armonk, New York at the time the above-identified application was conceived. I make this declaration in support of the above-identified application.
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Frederick Wu

Date: May 8, 2009



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Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Mathews Thomas, a citizen of the United States, residing in Flower Mound, Texas, hereby declare and state as follows:

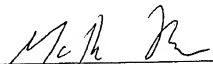
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Mathews Thomas

Date: May 20, 2009

Prepared for and/or by an IBM Attorney - IBM Confidential

**Last Modified By:** Mathews Thomas **Last Modified On:** 08/02/2002 09:41:42 AM

Required fields are marked with the asterisk ( \* ) and must be filled in to complete the form .

## A mechanism for automatically synchronizing items between retailers and suppliers based on a model-driven strategy

## Summary

Status	Under Evaluation
Final Deadline	
Final Deadline	
Reason	
Processing Location	
Functional Area	
Attorney/	
Patent Professional	
IDT Team	
Submitted Date	08/01/2002 04:14:22 PM MDT
* Owning Division	
Incentive Program	
Lab	
Technology Code	

[REDACTED]

## IDT Selection

### \*Main Idea

1. Describe your invention, stating the problem solved (if appropriate), and indicating the advantages of using the invention.

We propose a methodology that uses a solution template based approach to perform Business Process Integration. More specifically, we propose a methodology that uses the solution template approach for item synchronization problem in large enterprises.

Our method can reduce the complexities of the business integration task and reduce the time and the amount of effort for system integrators.

2. How does the invention solve the problem or achieve an advantage,(a description of "the invention", including figures inline as appropriate)?

We use the template design pattern to model and implement the behavior of business solutions. This pattern captures the outline or the skeleton of an algorithm or process, leaving the implementation to be customized by the implementers. This approach is used for business processes, by capturing a superset of states, transitions and generic flows, leaving the actual implementation and customizations to a particular solution instance. The artifacts that define and compose the superset are assembled and made available in a repository as a solution template. Individual businesses typically customize these templates and apply the solution to their business scenario. For item synchronization, we first propose A Retail-side Item Synchronization Process Template, We then illustrate the Solution Template High Level Structure, Process Choreography Components, Role Players and Activities, User Experience Components, B2B Connectors and EAI Adapters. Finally we put all the items together based on the template and construct the system.

The attached document details the approach:



BPI.pdf

3. If the same advantage or problem has been identified by others (inside/outside IBM), how have those others solved it and does your solution differ and why is it better?

We are not aware of others who have done similar work

4. If the invention is implemented in a product or prototype, include technical details, purpose, disclosure details to others and the date of that implementation.

Yes, a proof of concept was developed that included some of the elements included in the paper. The prototype involved the integration of SAP, Websphere and UCCnet to illustrate item synchronization. The attached chart provides further a summary of what was implemented.



PrivateExchange\_Phase3\_Implem\_v2.7 disclosure.ppt

The purpose of the proof of concept was to prove that some of the ideas in the paper could be implemented.

The proof of concept has been shown to several groups in IBM as well as external customers. Details of the technical implementation was not disclosed to customers so they are not aware of the contents of the paper. The proof of concept was completed in May, 2002.

**\*Critical Questions (Questions 1-9 must be answered in English)**

**\*Question 1**

**\*Question 2**

**\*Question 3**

\*Question 4

\*Question 5

\*Question 6

\*Question 7

\*Question 8

\*Question 9

[REDACTED]

Question 11

[REDACTED]

[REDACTED]

(Form Revised 12/17/97)

# **A Model-Driven Approach for Item Synchronization and UCCnet Integration**

Simon Cheng, Mathews Thomas  
IBM Global e-business Solution Center  
Dallas, TX

Santhosh Kumaran, Amaresh Rajasekharan, Frederick Wu, Yiming Ye, Ying Huang  
IBM T. J. Watson Research Center  
Yorktown Heights, NY

## **Abstract**

The pervasive connectivity of the Internet and the powerful architecture of the WWW are changing many market conventions and creating a tremendous opportunity for conducting business on the Internet. Digital marketplace business models and the advancement of Web related standards are tearing down walls within and between different business artifacts and entities at all granularities and at all levels, from devices, operating systems and middleware to directory, data, information, application, and finally the business processes. As a matter of fact, business process integration (BPI), which entails the integration of all the facets of business artifacts and entities, is emerging as a key IT challenge. In this paper, we describe our effort in exploring a new approach to address the complexities of BPI. More specifically, we study how to use a solution template based approach for BPI and explore the validity of this approach with a frequently encountered integration problem, the item synchronization problem for large enterprises. The proposed approach can greatly reduce the complexities of the business integration task and reduce the time and amount of effort of the system integrators. Different customers are deploying the described Item Synchronization system.

## **1. Introduction**

The emerging growth of electronic commerce over the Internet is bringing exciting opportunities for companies. However, reaping the full potential of e-commerce will depend on achieving Business Process Integration (BPI) - with minimal cost and effort. A successful BPI strategy can bring the implementation of e-business systems to a whole new level of productivity. As a matter of fact, system integration is emerging as a key IT challenge. The Gartner Group estimates that 40% of the average IT budget is spent on Systems Integration [1]. Integration is a multi-faceted problem, spanning the whole IT spectrum. At the lower ends of the spectrum are device integration, OS integration, and middleware integration. At the higher levels are directory integration, data integration, information integration, and application integration. At the highest level is business process integration (BPI). The BPI typically entails all the other facets of the integration problem across the spectrum.

It is crucial in electronic commerce to explore new approaches, paradigms, languages, technologies, and tools to effectively address the integration challenge. Currently, organizations run the business by defining their own business processes. These business processes define the type of transactions and the handling of exceptions in the context of process execution. Examples of such business processes include processing of Purchase Orders, Sales Orders, Request for Quotes (RFQ), and Contracts. Typically these business processes are long running transactions with complex interaction among various disjoint software components. These transactions in reality are not fully automated and have to use diverse software components, legacy systems and possibly many databases and backend enterprise information systems (EIS). Most of these processes span intra- and inter-organization boundaries, which might involve the task of automating business processes both within the enterprise and also with suppliers, retailers and other partners. However, it is often necessary for businesses to alter their business processes to keep pace with changing requirements and market conditions. It is not uncommon in the industry



to upgrade one or more existing applications to improve efficiency and increase resource utilization. Given the complexity in the business processes, these updates are seldom simple, and often trigger a ripple effect across various components. The goal of the integration effort is to make different components work together in a way that minimizes the changes required when the business process changes. The idea is to bring all these pre-fabricated pieces together and choreograph them to effectively automate the business process.

In this paper, we propose a model driven approach for business process integration. We argue that such an approach can reduce the complexity of BPI solutions in three ways. (1) It facilitates component reuse leading to reduced development time. (2) It enables architecture reuse leading to more repeatable solutions. (3) It enables the formalization of best practices into a well-defined methodology. We explore the validity of this approach using an integration problem frequently encountered in the retail industry. We present a case study in which we apply the model-driven business integration approach to address the item synchronization problem. Item Synchronization is the process by which a supplier introduces a new product to the market through retailers. A closely related process is used to update the attributes of an existing product. These processes are complex because a supplier's product identification code, associated attributes codes, and database structures are usually different from those of the retailers. Currently, much of the item synchronization process is accomplished manually. Expediting this process and reducing its cost has been a challenge for large enterprises. This is particularly true for enterprises with multiple divisions, which own and maintain their own divisional Item Databases. These enterprises not only need to synchronize their databases internally but also need to synchronize with their many trading partners through item updates.

This paper is organized as follows. We begin with a description of the model driven business integration approach. This is followed by the detailed definition of the item synchronization problem. Next we derive a "solution template" for item synchronization based on the principles of model driven business integration. We describe a concrete implementation of a solution for the item synchronization problem based on this solution template. We conclude with an analysis of this approach in the context of related work in this area.

## 2. Model Driven Business Integration

There are two primary reasons that contribute to the complexity of BPI solutions: (1) The need for a multitude of applications and systems distributed over the network and across enterprise boundaries to work together and deliver new functionality (2) The variability of the solution requirements between customer instances. In the model-driven approach, a small number of arbitrary modeling elements are used to express a large number of solution instances. By tuning the model parameters, we customize a specific solution instance. The structure of these modeling elements and the relationships between them are formalized via a metamodel. The definition of this metamodel is a key aspect of our approach.

### 2.1. Metamodel for Business Process Integration

The metamodel defines a common architecture for all BPI solutions. The modeling elements generated from the metamodel may be partitioned into the following functional modules: Process choreography components that choreograph the execution of business processes, conversational adapters for B2B integration and enterprise application integration, and screenflows for user experience integration. The metamodel supports solution management and access control specifications by decorations of the model elements.

The metamodel is defined via compositions. We begin with the following three simple constructs as the building blocks of the metamodel:

1. Business Objects (BOs) model the business data. Examples include Purchase Order, Contract, and Advance Shipping Notice (ASN).
2. Connectors model the components used for protocol adaptation. Examples include IIOP Connector, MQ Connector, and SOAP Connector.
3. Commands model an abstract operation. Examples include Create PO, Send ASN, and Cancel Contract.

We compose a small set of higher-order modeling elements, called “modeling artifacts”, using these basic building blocks. There are four such modeling artifacts: (1) Adaptive Documents (2) Flows (3) Screenflows and (4) Adapters. These compositions are driven by a set of organizational structures. There are three such organizational structures: (1) State machine (2) Flow composition model (3) Hierarchies. Below we discuss the modeling artifacts in detail.

Adaptive Documents (ADocs) are used to model the business artifacts of a solution. The business artifacts are different from business objects. The business artifacts are what the business process is all about. A business artifact could be “managing” a large number of business objects. A business artifact has a well-defined lifecycle, with a finite number of states. A business artifact is a semi-autonomous entity with state-dependent behavior. This behavior defines how the artifact responds to business events.

The ADoc metamodel is partitioned into two sections, a “controller” section that models the behavior of the business artifact and an “entity” section that models the business objects managed by the artifact. We model the behavior of a business artifact by means of a finite state machine and the Command design pattern [2]. The entity section is merely an aggregation of the primary keys of the business objects. A complete description of the ADoc metamodel is given in [13].

A flow artifact models the flow of control or data as a directed graph. It consists of a set of “activity” nodes and a partial order among these activities. The activities may be a simple command, another flow, or a temporal ADoc. There are two types of flow artifacts, microflows and macroflows. The microflows are atomic and uninterruptible while the macroflows are long running and interruptible.

The ability to define flows as activities leads to hierarchical compositions of flows. All terminal activities of a microflow are commands. In a macroflow, there is at least one terminal activity that is a temporal ADoc. The structure of a temporal ADoc is exactly the same as a regular ADoc, except that it models the activity lifecycle.

The screenflows model the user interaction with the BPI solution. Screenflows are modeled as compositions of “views” using a state machine. The state machine defines the “controller” in the classic Model-View-Controller paradigm. The views are context-driven, implying that the views change based on the role of the user and the context in which the user is interacting with the system. The views define the data being presented to the user and a set of actions that can be taken by the user. A combination of commands and business objects can be used to define a view. The state machine controller that choreographs the screenflow may use commands as part of state transitions to access the “model” in the MVC sense. This model could be an ADoc, an activity in a flow, or an adapter.

The adapters model the integration logic for B2B and EIS integration. It uses business objects, commands, and connectors. An adapter uses a connector for protocol adaptation. It uses a source business object, a target business object, and the mappings between them to define semantic adaptation. A command defines the abstraction of the action performed by an adapter.

Finally, a global composition model enables the synthesis of BPI solutions from the modeling artifacts discussed above. The global composition model provides a mechanism to connect the

screenflows with the ADOcs, the ADOcs with the activities, and the adapters with the activities or ADOcs.

## 2.2. Solution Templates for Business Process Integration

A set of ADOcs, flows, screenflows, and adapters may be defined for a specific solution domain. These artifacts may be composed into a BPI solution using the global composition model. The resulting composition of artifacts is called a “solution template”. For example, we may define a global composition for the item synchronization problem to create a Solution Template for Item Synchronization.

A solution template may include prototypical implementations of the modeling artifacts. Thus a solution template can provide not merely the metamodel, but the initial solution implementation itself. The implementation team can customize this initial solution to create a final solution using business rules and policies specific to a customer. More details on the solution template design can be found in [14].

## 3. Item Synchronization Problem

Designing and implementing solutions for item synchronization is challenging even with a very small number of internal item databases and trading partners, and is highly complex with multiple item databases and trading partners. The complexity arises from the fact that enterprises and the trading partners need to agree not only on the communication protocol, but also on the processes, message formats, message semantics, message contents, audit requirements, etc.

Traditionally the trading partners (suppliers and retailers) exchange the catalog information in a fairly proprietary way: The retailer checks the supplier catalogs periodically to learn of any changes, or the supplier publishes the catalog directly into the retailer’s systems. Both approaches have serious shortcomings. In the first model where the retailer polls the supplier database, the problem is the polling interval. For example, a supplier who is offering a product may change its price or available quantity. This will not be communicated to the retailer until the retailer chooses to check the catalog again. In some cases this time lag could be large. If the time gap were large, the catalog databases at both ends would be out of synch for a long time. One way to solve this problem would be to use a “Supplier Push” model as opposed to a “Retailer Pull” model. In the supplier push model, it is the supplier who pushes the data into the retailer side systems whenever there is an update. While this reduces the risk of catalog items being out of synch, it introduces a significant burden on the supplier. Many small suppliers have limited resources and IT skills. Requiring the supplier to push the catalog to retailer systems means expecting the supplier to understand the retailer’s systems and interfaces. The supplier needs to understand the schema, interfaces and the data of interest at the retailer side for each retail partner. This imposes a significant load on the supplier. Moreover, a change on the supplier side has to be triggered if one of the retailers changes its data format or interfaces. This makes the system difficult to maintain. In this supplier push model, the supplier needs to understand the following aspects of the retailer’s systems:

- Data format
- Data compliance, validation
- Publish / Search / Update capabilities
- System connectivity
- Application interfaces
- Transport format (XML standard or business objects, etc.)

Keeping track of all the above factors for every retailer imposes a heavy workload on the supplier. Extending the scenario a little bit, if a new retailer wants to do business with the supplier, the supplier needs to learn the new retailer’s systems and build the required

infrastructure to handle the retailer's requirements. Clearly this model cannot be considered scalable. In the ideal world, the supplier-retailer interaction could be described as "plug & play". That means that the trading partners should be able to work together without needing to understand each other's systems and without needing to change each other's systems. Extending this model, it would be ideal to isolate the supplier from any changes at the retailer side and vice versa. This brings us to a "hub and spoke" architecture. In this architecture, we have the hub in the center capturing information about all the trading partners. On one side we have the suppliers and on the other side we have the retailers. All the trading partners interact with the hub, remaining oblivious to the system intricacies on the other side of the hub.

In the hub and spoke architecture, we can get the best of both worlds viz., Retailer Pull and the Supplier Push. The idea is to have the supplier push the item information to the hub, which transfers the data to the retailer. The advantages of this architecture are as follows:

- The supplier systems need interact only with the hub. As a consequence, the supplier does not need to have intelligence to transform the data into different formats. All that is required at the supplier side is the knowledge of hub side interfaces and data formats.
- The retailer systems need not poll the supplier systems. The hub can transfer the item updates to the retailer side through a B2B transport.
- The retailer can also "subscribe" to a set of items or a category of items and any changes to them can be "published" to the retailer side from the hub.

UCCnet is an example of such a hub, providing an industry-wide synchronization database of product information for the CPG Industries [Error! Reference source not found.]. It has gained a lot of attention recently because of increasing industry support from major retailers such as Wal-Mart, Ahold, and Shaw's. UCCnet enables the participating trading partners, such as suppliers and buyers, to synchronize their item and related information via its portal and/or its machine-to-machine communication gateway.

Specifically, the UCCnet model has the following two key objectives:

- To provide a shareable registry of basic data about Universal Product Code (UPC) encoded items and the businesses that use them. One could think of this as a list of registered UPC's, called Global Trade Item Numbers (GTIN), and a list of every member company and its locations, called the Global Location Numbers (GLN).
- To publish and enforce standards, especially around processes (e.g., New Item Add) and transaction formats. This latter role is one that the UCCnet has borrowed from its parent company, the Universal Code Council, Inc. (UCC).

A supplier initiates UCCnet processes by adding the new product (item) information to UCCnet. Once the new item is in UCCnet, the supplier can publish the new item to selected retailers and their organizations. A retailer subscribes to UCCnet publications/notifications with user-defined filters. When the retailer receives a new item publication from the supplier, the retailer responds with one of the possible UCCnet pre-defined responses: AUTHORIZE, PREAUTHORIZE, PEND, REJECT, and DE-AUTHORIZE. Updating item information in UCCnet and publishing the updates to retailers follows essentially the same flow.

It should be noted that UCCnet currently only edits/validates 60+ attributes for a product, whereas a product may have hundreds of attributes of interest to retailers. A supplier whose backend systems do not have all of the required UCCnet attributes would need to complete any missing attributes via automatic and/or manual data entry before adding the item information to UCCnet. Many retailers will also require the supplier to provide the additional non-UCCnet attributes before the retailer validates and accepts the data. Methods of receiving the attributes from a supplier, editing them, and storing them in the retailer's backend systems vary from electronic communication via EDI to manual data entry by the supplier and/or the retailer.

## 4. Solution Template Definition

We use the item synchronization problem as one of the examples to validate the solution template approach for business process integration. A complete solution for item synchronization extends enterprise boundaries and will involve one or more hubs, several retailers, and a large number of suppliers. In this paper, we focus on the solution components that need to be deployed on the retailer side for item synchronization. We define a solution template for retailer-side item synchronization process.

### 4.1. Retailer-side Item Synchronization Process

The item synchronization process on the retailer side may be decomposed into the following stages: Initial Entry, Complete/Verify, Approval, Update Backends, and Acknowledgement. Initial Entry is the initial handling of the new item data from UCCnet. Complete/Verify is the step of completing missing attributes of the item required for a retailer's backend(s) but not provided by UCCnet. Approval is the step of approving the completed item data. Update Backends is the step of updating the retailer's backend(s) with the item data. Acknowledgement is the step of sending acknowledgement back to the supplier.

### 4.2. Process Choreography Components

The business artifact associated with the item synchronization process is "Item Data", which is modeled as an ADoc [13]. The arrival of the Item Data message at the retailer side triggers the creation of the ItemData ADoc. The ADoc spawns a workflow for completion, inspection, verification, and approval of the item data. Once it is approved, the ADoc updates the backend systems and sends notifications as necessary. Figure 1 shows the state machine that describes the behavior of the ItemData ADoc.

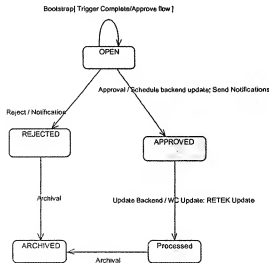


Figure 1: Item Data ADoc State Machine

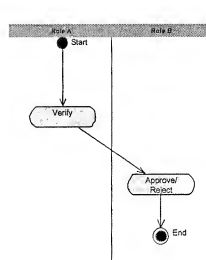


Figure 2: Workflow Collaboration

The verification, completion, and approval of item data constitute a collaborative workflow process. The macroflow artifact of the metamodel may be used to model this workflow. The macroflow defines a set of activities and a partial order among them. Figure 2 shows a simplified workflow in the item synchronization solution template. Both activities in the workflow are modeled as temporal ADocs.

### 4.3. User Experience Components

The screenflow artifacts that make up the user experience components of the solution template are shown in Table 1. Each screenflow artifact has an associated role property that determines the set of users who may interact with the system via that screenflow. The table shows typical values for role for the screenflows in the template.

Screenflow	Roles	Purpose
InitialEntry	Supplier, Cat Manager	Initial entry of item data into the retailer systems. This is an optional element. No screenflow is used if the item data is entered programmatically.
CompleteVerify	Supplier, Cat Manager, Asst Cat Manager	Completion of the missing fields in the item data and verification of data.
Approve	Cat Manager	Approval of the item data prior to commit.

Table 1: User Experience Components

### 4.4. Adapters

The last set of components in the solution template consists of the B2B connectors and EIS adapters. Table 2 shows the B2B connectors in the template. These artifacts are used to model the B2B integration of the item synchronization solution. In particular, this includes the integration of the retailer systems with the supplier systems and/or hub systems. The table shows the integration partner, integration protocol, purpose of integration, and the data being exchanged.

Connector	Protocol	Partner	Purpose	Data
1	IDDX	Supplier	Obtain additional attributes from partner	Item Data
2	UCCnet	Hub	Product data from central registry	Item Data
3	UDEX	Hub	Product data from central registry	Item Data
4	EDI	Supplier, Hub	Obtain additional attributes from partner	Item Data
5	XML	Supplier, Hub	Obtain additional attributes from partner	Item Data

Table 2: B2B Connectors

Table 3 shows the adapters used for integrating the enterprise systems of the retailer with the item synchronization process. For each adapter, the table shows the target system, the data being integrated, and the purpose of the integration.

Adapter	Target	Data	Purpose
1	RETEK	Item data	Master Catalog integration
2	WCS	Item data	Store

			Front/Internal Procurement Site integration
3	JMS Connector	Item data	Integration with message-driven EISs
4	JDBC Connector	Item data	Temporary Storage of item data prior to commit

Table 3: EIS Adapters

#### 4.5. Putting It All Together

The final step in the definition of the solution template is the global composition of the solution artifacts into an end-to-end solution for item synchronization.

The Item Data ADoc provides the context for the activities in the Verify-Approve workflow. At execution time, when these activities become available, they dynamically bind with the Item Data ADoc. This implies that all business events directed to the Item Data ADoc are propagated to the temporal ADoc representing the activity that is bound to the ADoc. The global composition model facilitates the definition of this dynamic binding between ADocs and activities.

Each of the screenflows connects to the Item Data ADoc. The EIS adapters are connected to the ADoc via the command invocations in the state machine transitions. Certain B2B adapters can trigger business events that lead to the creation of an ADoc while others serve as the receivers for the commands that get executed by the ADoc controller. Figure 3 shows a complete solution template, albeit highly simplified.

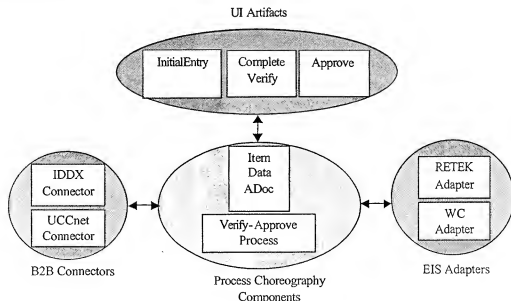


Figure 3: Item Synchronization Solution Template

#### 4.6. Customization

We customize a solution template by tuning the model parameters to match the needs of a specific customer. For example, we can customize the ADoc behavior by changing the definition of the state machine, the commands that get executed as part of the state transitions, and/or the receivers of these commands. The macro and micro flow definitions can be changed as well. Screenflow definitions can be easily modified to suit the needs of a specific engagement. Adapters may be modified or new adapters may be added. These changes are done at the modeling level and very little, if any, code changes are needed.

#### 5. Customer Validation

This section discusses the validation of our approach by applying the item synchronization solution template to four retailers. Table 4 shows the customization points for each retailer. Changing the definitions of the modeling artifacts and the global composition model easily accommodates these customization needs.

Customization Points	A	B	C	D
Initial Entry	Via B2B Connector (UCCnet)	Via B2B Connector (UCCnet)	Via B2B Connector (IDDX)	Via Screenflow
CompleteVerify	Workflow with 2 activities – assistant category manager and supplier	Workflow with 1 activity – assistant category manager	No user interaction; Automatic verification via software.	Workflow with 1 activity – assistant category manager
Approval	Approval workflow with 1 activity – category manager	Approval workflow with 1 activity – category manager	Approval workflow with 1 activity – category manager	Approval workflow with 1 activity – category manager
Update Backends	EAI connector (ReteK)	EAI connector (ReteK)	EAI connectors (ReteK, ezMarket)	EAI connectors (ReteK, ezMarket)
Acknowledgement	B2B Connector (UCCnet)	B2B Connector (UCCnet)	None	Acknowledgement workflow with 1 activity - supplier

Table 4: Item Synchronization customization for four retailers

The sequence diagram in Figure 4 shows how the various artifacts of the solution template orchestrate the execution of the item synchronization scenario for Retailer A, which is a UCCnet subscriber. In response to a query from Retailer A, UCCnet sends a New Item Message to the retailer through the UCCnet Connector. The UCCnet Connector immediately persists the message for audit purposes and sends it to process choreography engine resulting in the creation of an Item Data ADoc. The ADoc initiates a workflow process. The first step in the workflow is to notify (by e-mail) the Assistant Category Manager of the arrival of a new item. The Assistant Category Manager logs onto the system, views the UCCnet data for the new item, and adds attribute data



specific to Retailer A, such as an internal product identifier. This interaction is modeled using the CompleteVerify screenflow. Upon completion of input by the Assistant Category Manager, the workflow notifies a user on the supplier side to add further data that is specific to Retailer A, such as the discounted cost based on a contract between the supplier and the retailer. When this step is complete, workflow notifies the Retailer's Category Manager, who verifies the complete set of item attributes and makes the decision to approve or reject the new item for the retailer's stores. Approval completes the workflow process, and initiates an update of the retailer's master catalog by the RETEK adapter. After the master catalog update is successful, the ADoc instructs the UCCnet Connector to send an approval message to UCCnet.

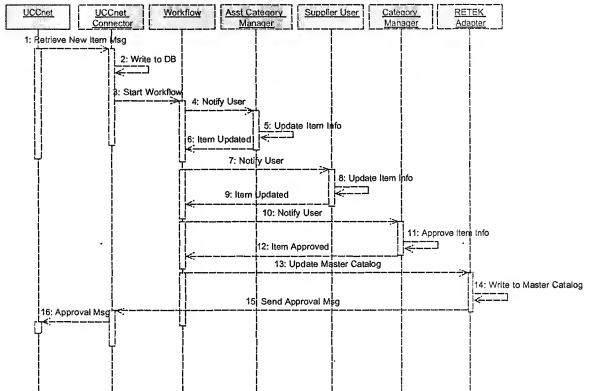


Figure 4: 'Retailer A' Item Synchronization Sequence Diagram

## 6. Analysis and Related Work

The fundamental driver behind our template-based approach for business process integration is the highly influential work on design patterns [2]. Gamma et al define design patterns as “descriptions of communicating objects and classes that are customized to solve a general design problem in a particular context”. Similarly, our metamodel describes communicating modeling objects that solve the business process integration problem in the context of a specific solution domain.

Most of the work in code reuse has been focused around object-oriented frameworks [16]. An excellent example of an object-oriented framework targeted to business applications is the San Francisco project [9,3,4]. Our solution template approach differs from this and other frameworks in many ways:

- Solution templates are at a higher level of abstraction than OO frameworks. While OO frameworks can be embodied in code, only examples of solution templates can be embodied in code.
- Frameworks are more specialized than solution templates. For example, frameworks have been designed to help build graphical editors, compilers for different programming languages and target machines, and financial modeling applications. In contrast, we position our solution template metamodel as a design pattern for business process integration.
- Primary mechanism for customization in OO frameworks is inheritance. Solution templates are customized by scripting behavior of the modeling artifacts.
- The OO frameworks are targeted primarily for solution development. Our work addresses the solution assembly and integration problem. They are complimentary in the sense that OO frameworks could be used for developing solution components and the solution template could be used to integrate these components with legacy applications and Web services to realize new business functions.

Standardization is key to the success of the solution template approach. Standardization can lead to the commoditization of the components consistent with our solution template metamodel. This could facilitate a “plug-and-play” paradigm for business process integration. The standardization work currently going on in Web Services and J2EE are encouraging developments in this area. For example, Web Services Flow Language (WSFL) [17] has been proposed as a standard for defining flow models. The flow models are merely a part of our BPI metamodel. There is a lot more work to be done in defining standards that cover the complete BPI spectrum.

Another encouraging development in the standardization area is the emerging OMG specification on UML Profile and Interchange Models for Enterprise Application Integration [18]. This specification defines two metamodels: (1) EAI Integration Metamodel. (2) EAI Common Application Metamodel. The current version of our BPI metamodel externalizes EAI adapters and does not attempt to model the actual adapters themselves. The metamodels discussed in the OMG specification is complementary to the work discussed in this paper.

In addition to the development of industry standards, solution templates will not succeed without the runtime and build-time support. IBM’s application framework for e-Business is an excellent example of a runtime that can provide all of the services needed for the execution of solutions generated using the template [19]. We are currently working on a holistic tooling environment for solution templates [20]. Such an environment should support a searchable solution template repository, provide tools to create and modify individual artifacts as well as the global compositions, and support verification and simulation of the solutions.

## 7. Concluding Remarks

Business process integration and automation has emerged as an important area in business computing. It is widely acknowledged that business process integration is an extremely complex problem. We use a model-driven approach to address the complexity of this problem. A model-driven approach is only as good as the model being employed. Thus the success of our approach hinges on the merits of our solution template metamodel. Our current work focuses on applying the solution template concept to as many customer problems as possible in order to validate the model. Given the importance of the right model, we conclude with the following exchange between Achilles and Tortoise in [21]:

*Achilles:* Well, my master explained to me that shifting between domains can help. It is like switching your point of view. Things sometimes look complicated from one angle,

but simple from another. He gave the example of an orchard, in which from one direction no order is apparent, but from special angles, beautiful regularity emerges. You have ordered the same information by changing your way of looking at it.

*Tortoise:* I see.

## 8. References

1. <http://www.eaijournal.com/Article.asp?ArticleID=295>
2. C. Alexander, S. Ishikawa, M. Silverstein, M. Jacobson, S. Angel. A Pattern Language. Oxford University Press, New York, 1977
3. V.D. Arnold, R. Bosch, E. Dumstorff, P. Helfrich, T. Hung, V. Johnson, R. Persik, and P. Whidden, "IBM Business Frameworks: San Francisco Project Technical Overview". IBM Systems Journal 36, No. 3, 437-445, 1997.
4. K. Bohrer, "Architecture of the San Francisco Frameworks", IBM Systems Journal 37, No. 2, 156-169, 1998.
5. K. Bohrer, "Middleware Isolates Business Logic," Object Magazine 7, No. 9 (November 1997)
6. Booch, Object-Oriented Design with Applications, The Benjamin/Cummings Publishing Co., Redwood City, CA (1991)
7. J. Coplien and D. Schmidt, Pattern Languages of Program Design, Addison-Wesley Publishing Co., Reading, MA (1995).
8. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design Patterns, elements of reusable object-oriented software, Addison-Wesley Publishing Company, (1994)
9. E. Jaufmann, and D. Logan, "The use of IBM San Francisco core business process as accessors to Enterprise JavaBeans components", IBM Systems Journal 39, Vol. 39, No. 2, 2000.
10. T. W. Malone and K. Crowston, "The Interdisciplinary Study of Coordination," Computing Surveys 26, No. 1, 87-119 (1994)
11. D. A. Taylor, "The Use and Abuse of Reuse," Object Magazine 6, No. 2, 16-18 (April 1996)
12. K. Weick and K. Roberts, "Collective Mind in Organizations: Heedful Interrelating on Flight Decks," Administrative Science Quarterly, 357-381 (1993).
13. S. Kumaran, P. Nandi, K. Bhaskaran, T. Heath, R. Das, "ADoc-Oriented Programming", IBM Research Report.
14. Y. Huang, "Design of a Solution Template for Business Process Integration", IBM Research Report.
15. [www.uccnet.org](http://www.uccnet.org), "Universal foundation for electronic commerce."
16. R. E. Johnson and B. Foote, "Designing reusable classes", Journal of Object-Oriented Programming, June/July 1988.
17. F. Leymann, "Web Services Flow Language", IBM Corporation, 2001.
18. OMG, "UML Profile and Interchange Models for Enterprise Application Integration", January 2002.
19. [www.ibm.com/developer/features/framework/framework.html](http://www.ibm.com/developer/features/framework/framework.html), Application Framework for e-Business.
20. S. Kumaran, "End-to-end BPM Tooling", IBM Academy of Technology Business Process Integration Conference, May, 2002.
21. Douglas R. Hofstadter, "Godel, Escher, Bach: An Eternal Golden Braid".

# Collaborative Enterprise:

## *UCCnet - Item Synchronization Implementation Overview*

7/24/2002

IBM Global e-business Solution Center  
Dallas, TX



Destiny  
Your Business

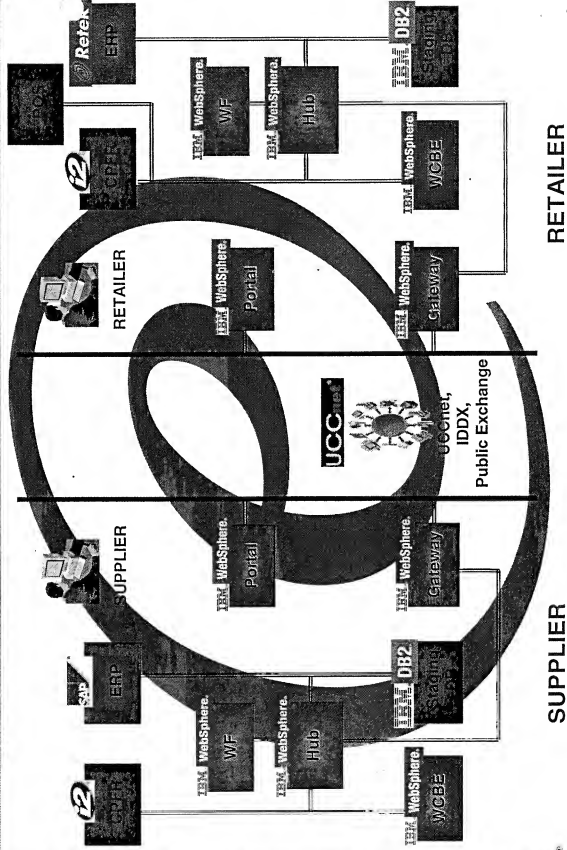
Flexible

Integration

Control

IBM Confidential

## B2B Collaboration Participants – Overview



## Scenario – Supply Side

### New Item Addition to UCCnet

- ◆ Supplier creates new item in SAP
- ◆ New item is added to UCCnet automatically via WS hub and gateway

### New Item Publication to Retailer

- ◆ New item is published to Retailer automatically via WS hub and gateway

Note: The above steps could also be done manually.

Control

Integration

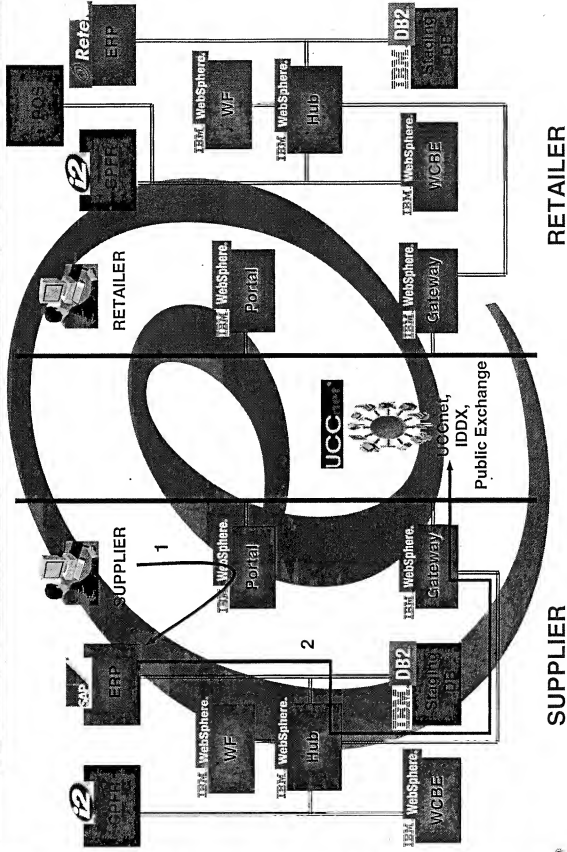
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# Supply Side – New Item Addition to UCCnet



Control

Integration

Flexible

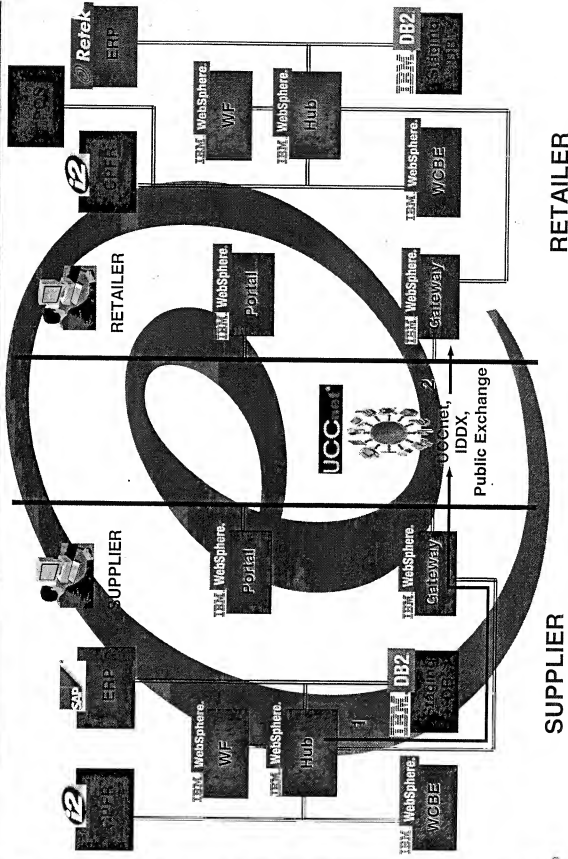
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SUPPLIER

RETAILER

# Supply Side – New Item Publication to Retailer



Control

Integration

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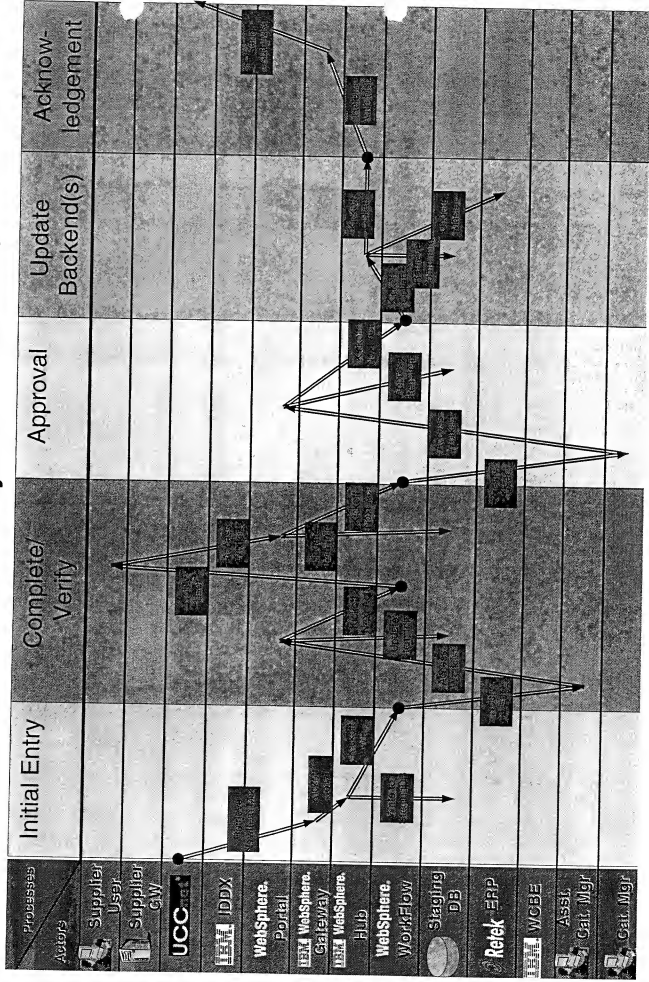


## Scenario – Retail Side

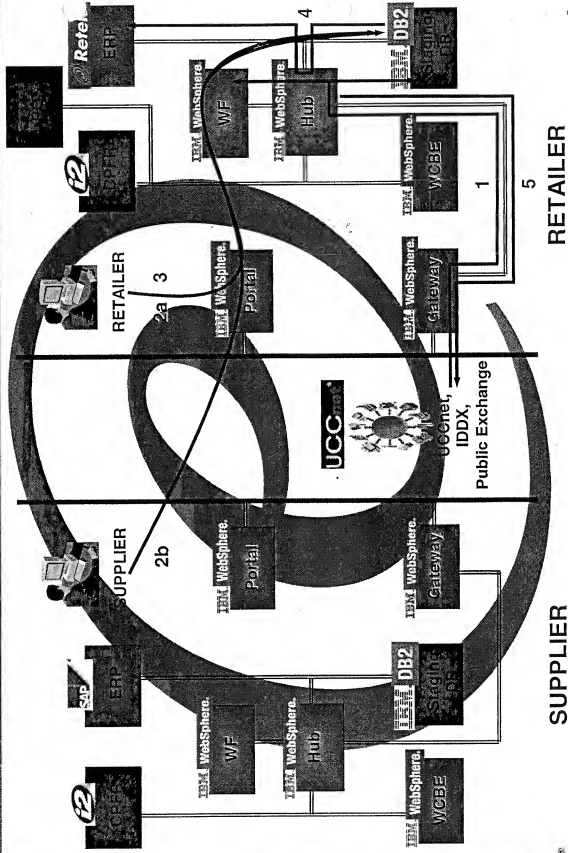
### Processing new item from UCCnet

- ◆ Initial entry
  - New item publication is retrieved from UCCnet via WS gateway
  - It is stored in the staging database and the workflow is started
- ◆ Complete/Verify
  - Assistant category manager verifies/completes item data
  - Supplier completes item data via Retailer's extranet
- ◆ Approval
  - Category manager approves completed item data
- ◆ Update Backend(s)
  - ERP/master catalog is updated
- ◆ Acknowledgement
  - AUTHORIZER response is sent to UCCnet/Supplier via WS gateway

# Business Flow – Item Sync – Retail Side



# Retail Side - Processing New Item from UCCnet



SUPPLIER

RETAILER



Destiny  
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Flexible

Integration

Control

# Exhibit B



## IP&L Disclosure Evaluation: BOC8-2002-0086

Prepared for and/or by an IBM Attorney - IBM Confidential

Created By: Ken Rayborn Created On: 08/19/2002 03:50:29 PM

Last Modified By: Ken Rayborn Last Modified On: 08/19/2002 04:45:31 PM

Required fields are marked with the asterisk (\*) and must be filled in to complete the form.

### Title of disclosure

A mechanism for automatically synchronizing items between retailers and suppliers based on a model-driven strategy

Response Due to IP&L: 09/02/2002

Evaluation Submitted : 08/19/2002

### FACTOR 1 - TECHNICAL CONTRIBUTION

(Consider all Known publications/products - IBM and External)

Describe the invention. Answer the following questions:

1. What is the problem or the need that the invention addresses?  
2. How does the invention solve the problem or need?  
3. What are the advantages of the invention?

### FACTOR 2 - BUSINESS VALUE

Describe the invention.

1. What is the problem or the need that the invention addresses?  
2. How does the invention solve the problem or need?  
3. What are the advantages of the invention?

The proposed invention is a solution to the problem of business synchronization between retailers and suppliers.

### FACTOR 3 - BUSINESS VALUE

Describe the invention. Answer the following questions:  
1. What is the problem or the need that the invention addresses?  
2. How does the invention solve the problem or need?  
3. What are the advantages of the invention?

### FACTOR 4 - BUSINESS VALUE



# Exhibit C



8051 Congress Avenue  
Boca Raton, FL 33487

6169-385

March 13, 2003

Akerman, Senterfitt  
222 Lakeview Avenue  
4th Floor  
West Palm Beach, FL 33401

REF: Invention Disclosure: BOC8-2002-0086  
Title: A mechanism for automatically synchronizing items between retailers and suppliers  
based on a model-driven strategy  
IBM Docket: BOC9-2003-0015

Dear Kevin,

Please prepare and file the above referenced cases with the U.S. Patent and Trademark Office. A copy of the invention disclosure, patentability search results and inventor's comments are enclosed for your use in preparation of the applications in accordance with IBM's format.

Please be informed that a paper based on this work will be presented at the ICEIS conference April 23-25 in Angers, France. We will not require you to file this application prior to that date. This will be a US only filing. Please let me know if you have any questions.

Sincerely,

Richard A. Tomlin  
(561)862-2732

Enclosures

RECEIVED  
DOCKETING

MAR 14 2003

AKERMAN SENTERFITT, P.A.

Exhibit "D"

Boca Raton  
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March 14, 2003

Richard A. Tomlin, Esquire  
IBM Corporation  
8051 Congress Avenue  
IMAD 4041  
Boca Raton, FL 33487

RE: New U.S. Patent Application  
MECHANISM FOR AUTOMATICALLY SYNCHRONIZING ITEMS  
BETWEEN RETAILERS AND SUPPLIERS BASED ON A  
MODEL-DRIVEN STRATEGY  
IBM Docket No. BOC9-2003-0015; Our Reference No.: 6169-385

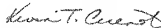
Dear Dick:

Thank you for your letter dated March 13, 2003. In accordance with IBM standard protocol, a patent application will be prepared and filed in the above-referenced matter on or before September 9, 2003. Notwithstanding, we will strive to prepare the patent application in an expedient manner.

As always, thank you for allowing us to be of assistance to you.

Very truly yours,

AKERMAN SENTERFITT



Kevin T. Cuenot

KTC/aa

cc: Gregory A. Nelson, Esquire

# Exhibit "E"

**From:** Valee Bartels  
**To:** Cheng, Tsz Simon; Huang, Ying; Kumaran, Santhosh; Rajasekharan, Amaresh;  
Thomas, Mathews; Wu, Frederick; Ye, Yiming  
**Date:** 10/14/03 2:45PM  
**Subject:** IBM Docket No. BOC9-2003-0015; Our Docket No. 6169-385

Re: Draft Patent Application for ARCHITECTURE FOR BUSINESS PROCESS INTEGRATION  
IBM Docket No. BOC9-2003-0015; Our Docket No. 6169-385

Dear Inventors:

Attached please find a draft of a patent application and associated drawings for your review in the above-identified matter. Please review the application carefully to ensure that the description of the invention accurately recites all of the invention's characteristics in the broadest possible manner, while also explaining, in detail, the preferred embodiment of the invention. The drawings should also be reviewed to confirm that they accurately depict the various details of the invention as you and your co-inventors understand them.

Importantly, please ensure that each inventor named on the cover sheet of the patent application has contributed to the conception of your invention as described in at least one of these claims. If for some reason we have neglected to list an inventor who has contributed to the conception of subject matter described in a claim, please so advise us immediately.

Once you have reviewed it, please forward your comments and/or any suggestions you may have.

Very truly yours,

Brian K. Buchheit\*  
Akerman Senterfitt  
222 Lakeview Avenue, Suite 400  
West Palm Beach, FL 33402-3188  
Voice: (561) 671-3674  
Fax: (561) 659-6313  
E-mail: [bbuchheit@akerman.com](mailto:bbuchheit@akerman.com)  
Web: [www.akerman.com](http://www.akerman.com)  
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United States Patent and Trademark Office

\* Sent on Mr. Buchheit's behalf to  
avoid delay

Valee Bartels  
Legal Assistant to Kevin T. Cuenot  
and Brian K. Buchheit  
Akerman, Senterfitt & Eidson, P.A.  
222 Lakeview Avenue, Suite 400  
West Palm Beach, FL 33401  
Ph: 561.653.5000, ext. 3434  
Fax: 561.659.6313  
E-mail: [vbartels@akerman.com](mailto:vbartels@akerman.com)

CC: Buchheit, Brian; Cuenot, Kevin T.; Venturelli, Elaine



# Exhibit "F"

From: "Yiming Ye" <yiming@us.ibm.com>  
To: "Alaine Allison" <AAllison@Akerman.com>  
Date: 11/3/03 3:56PM  
Subject: Re: IBM Docket No. BOC9-2003-0015; Our Docket No. 6169-385

Dear Alaine,

We all checked the document and we don't not have any further comments.

Thanks,

Yiming

"Alaine Allison"

<AAllison@Akerman.com> To: Amaresh Rajasekharan/Watson/IBM@ibmus, Frederick y  
Wu/Watson/IBM@IBMUS, Santhosh Kumaran/Watson/IBM@IBMUS,

Simon

Cheng/Dallas/IBM@IBMUS, Yiming Ye/Watson/IBM@IBMUS, Ying  
11/03/2003 01:22 Huang/Watson/IBM@IBMUS

PM cc: "Brian Buchheit" <BBuchheit@Akerman.com>, "Kevin T.  
Cuenot" <KCuenot@Akerman.com>, Elaine Venturelli/Boca  
Raton/IBM@IBMUS

Subject: IBM Docket No. BOC9-2003-0015; Our Docket No.  
6169-385

RE: Draft Patent Application for ARCHITECTURE FOR BUSINESS PROCESS  
INTEGRATION

IBM Docket No. BOC9-2003-0015; Our Docket No. 6169-385

Dear Inventors:

On October 14, 2003, an initial draft of the above-referenced patent application was forwarded to you electronically for your review and comments. This application is one of many we have been asked by the IBM Boca IP Law Department to have on file with the U.S. Patent and Trademark Office on or before IBM's year end. Can you kindly advise as to the status of your review of the application, or, in the preferred alternative, provide your comments to said application directly to Mr. Buchheit at [bbuchheit@akerman.com](mailto:bbuchheit@akerman.com)?

If you require additional information to aide you in your review, please so advise. Your prompt attention to this application is, as always, greatly appreciated.

# Exhibit "G"

**From:** Kevin T. Cuenot (Alaine Allison)  
**To:** Cheng, Tsz "Simon"; Huang, Ying; Kumaran, Santhosh; Rajasekharan, Amaresh;  
Thomas, Mathews; Wu, Frederick; Ye, Yiming  
**Date:** 11/5/03 12:02PM  
**Subject:** IBM Docket BOC9-2003-0015 / Our Docket 6169-385

RE: Final Draft Patent Application for  
ARCHITECTURE FOR BUSINESS PROCESS INTEGRATION  
IBM Docket No. BOC9-2003-0015; Our Docket No. 6169-385

Dear Inventors:

Enclosed please find for execution a final draft of the above-identified Patent Application, Drawings, the Declaration and Power of Attorney, the Assignment, and the Oath and Assignment for the Republic of China.

After your review of the application, if the patent application accurately recites all of the invention's characteristics, I ask that **Inventor THOMAS** please print out the formal documents, sign and date where indicated, have Mr. Cheng sign and date where indicated, then forward by overnight delivery to **Inventor YE** in the TJ Watson location to coordinate obtaining original signatures from the remaining inventors. After all inventors have signed the formal documents, **Inventor YE** please fax the formal documents to our attention at fax number 561-659-6313. The originally executed formal documents should be sent directly to Ms. Venturelli in the Boca IP Law Department.

Please note that pursuant to IBM's request, all of the signatures must be contained on the same documents.

Please keep in mind that we have been asked by the IP Law Department to file the referenced patent application in the U.S. Patent and Trademark Office on or before year-end, and as such, would appreciate your prompt attention to this request.

Please feel free to contact Mr. Cuenot or myself should you have any questions or comments.

Very truly yours,

AKERMAN SENTERFITT

Kevin T. Cuenot, Esquire\*  
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\*Licensed to practice before the  
United States Patent and Trademark Office

*Sent on Mr. Cuenot's behalf to avoid delay*

Alaine Allison  
Secretary to Kevin T. Cuenot, Esquire  
and Brian K. Buchheit, Esquire  
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**CC:** Buchheit, Brian; Cuenot, Kevin T.; Esquivel, Melanie; Venturelli, Elaine

**DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**ARCHITECTURE FOR BUSINESS PROCESS INTEGRATION**

the specification of which is attached hereto and identified by the Attorney Docket Number appearing above.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

**Prior Foreign Application(s)**

<u>Number</u>	<u>Country</u>	<u>Day/Month/Year</u>	<u>Priority Claimed</u>
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I hereby claim the benefit (a) under Title 35, United States Code, § 119(e) of any U.S. application listed below and identified as a provisional application, or (b) under Title 35, United States Code, § 120 of any U.S. application listed below and not identified as a provisional application, and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior U.S. application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information material to the patentability of this application as defined in Title 37, Code of Federal Regulations, § 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

**Prior U.S. Application(s)**

<u>Serial Number</u>	<u>Filing Date</u>	<u>Status</u>
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

J. Rodman Steele, Jr.	Reg. No. 25,931	Theodore M. Green	Reg. No. 41,801
Gregory A. Nelson	Reg. No. 30,577	Michael K. Dixon	Reg. No. 46,665
Joseph W. Bain	Reg. No. 34,290	Sarah E. Smith	Reg. No. 50,488
Stanley Kim	Reg. No. 42,730	Amy A. Ostrom	Reg. No. 52,088
Mark D. Passler	Reg. No. 40,764	Brian K. Buchheit	Reg. No. 52,667
Kevin T. Cuenot	Reg. No. 46,283	Margaret J. McLaren	Reg. No. 53,303
Neil R. Jetter	Reg. No. 46,803	Peter A. Chiabotti	Reg. No. 54,603
Pablo Meles	Reg. No. 33,739	Richard A. Tomlin	Reg. No. 24,449

Send correspondence to Gregory A. Nelson, Akerman Senterfitt, 222 Lakeview Avenue, Fourth Floor, P.O. Box 3188, West Palm Beach, Florida 33402-3188 and direct all telephone calls to Gregory A. Nelson at (561) 653-5000.

<b>First Inventor:</b>	Tsz Simon CHENG
------------------------	-----------------

*Signature:* \_\_\_\_\_

*Residence:* Grand Prairie, Texas

*Date* \_\_\_\_\_

*Citizenship:* United States

*Post Office Address:* 2439 Shadow Pass, Grand Prairie, Texas 75050

<b>Second Inventor:</b>	Ying HUANG
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*Signature:* \_\_\_\_\_

*Residence:* Westchester, New York

*Date* \_\_\_\_\_

*Citizenship:* United States

*Post Office Address:* 2161 Sultana Drive, Westchester, New York 10461

<b>Third Inventor:</b>	Santhosh KUMARAN
------------------------	------------------

*Signature:* \_\_\_\_\_

*Residence:* Croton On Hudson, New York

*Date* \_\_\_\_\_

*Citizenship:* India

*Post Office Address:* 28 Quaker Bridge Road, Croton On Hudson, New York 10520

<b>Fourth Inventor:</b>	Amaresh RAJASEKHARAN	
<i>Signature:</i>		
<i>Residence:</i>	Cortlandt Manor, New York	<i>Date</i>
<i>Citizenship:</i>	India	
<i>Post Office Address:</i>	5 Valerie Lane, Cortlandt Manor, New York 10567	
<b>Fifth Inventor:</b>	Mathews THOMAS	
<i>Signature:</i>		
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<i>Citizenship:</i>	United States	
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<b>Sixth Inventor:</b>	Frederick Y. WU	
<i>Signature:</i>		
<i>Residence:</i>	Cos Cob, Connecticut	<i>Date</i>
<i>Citizenship:</i>	United States	
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<b>Seventh Inventor:</b>	Yiming YE	
<i>Signature:</i>		
<i>Residence:</i>	White Plains, New York	<i>Date</i>
<i>Citizenship:</i>	Canada	
<i>Post Office Address:</i>	30 Lake Street, Apt. 6-I, White Plains, New York 10603	

ASSIGNMENT

WHEREAS, we:

- |     |                                               |                                              |
|-----|-----------------------------------------------|----------------------------------------------|
| (1) | Tsz Simon CHENG<br>County of Dallas           | Of Grand Prairie<br>and State of Texas       |
| (2) | Ying HUANG<br>County of Westchester           | Of Westchester<br>and State of New York      |
| (3) | Santhosh KUMARAN<br>County of Westchester     | Of Croton On Hudson<br>and State of New York |
| (4) | Amaresh RAJASEKHARAN<br>County of Westchester | Of Cortlandt Manor<br>and State of New York  |
| (5) | Mathews THOMAS<br>County of Denton            | Of Flower Mound<br>and State of Texas        |
| (6) | Frederick Y. WU<br>County of Fairfield        | Of Cos Cob<br>and State of Connecticut       |
| (7) | Yiming YE<br>County of Westchester            | of White Plains<br>and State of New York     |

have invented certain improvements in

**ARCHITECTURE FOR BUSINESS PROCESS APPLICATION**

and executed a United States patent application therefore on the following date(s):

- (1) \_\_\_\_\_
- (2) \_\_\_\_\_
- (3) \_\_\_\_\_
- (4) \_\_\_\_\_
- (5) \_\_\_\_\_
- (6) \_\_\_\_\_
- (7) \_\_\_\_\_

Whereas, INTERNATIONAL BUSINESS MACHINES CORPORATION, a corporation of New York, having a place of business at New Orchard Road, Armonk, New York, 10504 (hereinafter called IBM), desires to acquire the entire right, title and interest in the application and invention, and to any United States and foreign patents to be obtained therefore;

Now therefore, for a valuable consideration, receipt whereof is hereby acknowledged, we, the above named, hereby acknowledge our prior existing obligation and hereby sell, assign, and transfer to IBM, its successors and assigns, the entire right, title and interest in the application and invention therein disclosed for the United States and foreign countries, and all rights of priority resulting from the filing of the United States application, and we request the Commissioner of Patents to issue any Letters Patent granted upon the

invention set forth in the application to IBM, its successors and assigns; and we hereby agree that IBM may apply for foreign Letters Patent on invention and we will execute all papers necessary in connection with the United States and foreign applications when called upon to do so by IBM.

SIGNED AND SEALED:

	<u>LOCATION</u>	<u>DATE</u>	<u>SIGNATURE</u>
(1)	_____	_____	_____ Tsz Simon CHENG
(2)	_____	_____	_____ Ying HUANG
(3)	_____	_____	_____ Santhosh KUMARAN
(4)	_____	_____	_____ Amaresh RAJASEKHARAN
(5)	_____	_____	_____ Mathews THOMAS
(6)	_____	_____	_____ Frederick Y. WU
(7)	_____	_____	_____ Yiming YE



**REPUBLIC OF CHINA OATH AND ASSIGNMENT**

1. The undersigned: Tsz Simon Cheng, Ying Huang, Santhosh Kumaran, Amaresh Rajasekharan, Mathews Thomas, Frederick Y. Wu, and Yiming Ye

Citizen(s) of: United States, India and Canada

residing at: 2439 Shadow Pass, Grand Prairie, TX 75050  
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 28 Quaker Bridge Road, Croton On Hudson, NY 10520  
 5 Valerie Lane, Cortlandt Manor, NY 10567  
 1321 Tarragon Drive, Flower Mound, TX 75028  
 146 Cat Rock Road, Cos Cob, CT 06807-1302  
 30 Lake Street, Apt. 6-I, White Plains, NY 10603

hereby undertake that the invention/new utility model/new design entitled

**ARCHITECTURE FOR BUSINESS PROCESS INTEGRATION**

was truly invented by us. The undersigned agree to accept punishments provided for in laws in case of any imposture, plagiarism, imitation or deceptive activities and understands that willful false statements are punishable by law.

2. The undersigned hereby assign all my/our rights and interests regarding the invention/new utility model/new design as far as the Republic of China is concerned to:

**INTERNATIONAL BUSINESS MACHINES CORPORATION**

(hereinafter called Assignee), a corporation organized and existing under the laws of the State of New York, United States of America, and located at New Orchard Road, Armonk, New York 10504, United States of America;

and do hereby declare that the Assignee is entitled to applying for and obtaining patent rights on the invention/new utility model/new design in its own name in the Republic of China.

<u>Signature(s)</u>	<u>Date</u>
Tsz Simon Cheng	
Ying Huang	
Santhosh Kumaran	
Amaresh Rajasekharan	
Mathews Thomas	
Frederick Y. Wu	
Yiming Ye	

Exhibit "H"



Fort Lauderdale  
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Miami  
Orlando  
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November 17, 2003

Ms. Elaine Venturelli  
IBM Corporation  
8051 Congress Ave., IMAD 4042  
Boca Raton, FL 33487

Re: New U.S. Patent Application  
ARCHITECTURE FOR BUSINESS PROCESS INTEGRATION  
IBM Docket No.: BOC9-2003-0015; Our Docket No.: 8169-385

Dear Elaine:

Please be advised that the above-referenced application was filed in the United States Patent and Trademark Office (USPTO) on November 17, 2003. Enclosed for your records are copies of all papers as filed, the originally executed formal documents and the diskette.

In order to continue to satisfy the strictly enforced duty of disclosure under U.S. practice, please promptly advise us of any additional prior art information which is now known or which may become known to those involved in the preparation or prosecution of this application, and which the U.S. Examiner may deem relevant to patentability of the claims. Such information should include any commonly assigned patents and pending applications disclosing and/or claiming closely related subject matter.

In order to avoid possible late fees, all such additional information which is now known should be sent to us in sufficient time for filing by **February 17, 2004**. For information which may later become known, please send us such information in sufficient time for filing within three months from the date the information was first known to anyone involved in the preparation or prosecution of this application, together with the date the information was first known.

We will keep you promptly informed of further developments as they occur. In the meantime, if you have any questions, please do not hesitate to contact us. As always, thank you for allowing us to be of service to you in this matter.

Very truly yours,

AKERMAN SENTERFITT

Kevin T. Cuenot

KTC/aa  
Enclosures